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WASTESCAPES IN PORT CITIES. NAPLES AND ROTTERDAM: A SPATIAL AND INSTITUTIONAL COMPARISON ON THE ROLE OF PORTS AS PROMOTERS OF CIRCULAR ECONOMY

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Abstract

Ports have historically followed a linear model of growth. Formation, expansion, reallocation, abandonment, and redevelopments are just some of the steps that are followed over time by ports from all over the world. Circularity – a goal that both ports and cities hope to achieve in the near future – is not a new topic anymore. Although the global pressures to achieve this goal are immense, it can be stated that most port cities still have not yet made serious steps towards new circular models of growth. On the contrary, ports are still expanding, and they still generate serious amounts of waste, while also leaving networks of left-over territories that lay in states of wastefulness: port-city wastescapes. Two cases regarding these wastescapes are discussed. Naples, which is used to show land in limbo, while Rotterdam is used to show a port in transition. This article argues that a circular regeneration of these wastescapes can play a crucial role in re-imagining a new form of integration between the port, the city, and the metropolitan territory.

Keywords: wastescapes, port-city, circular economy

PAESAGGI DI SCARTO NELLE CITTÀ PORTUALI. NAPOLI E ROTTERDAM: UN'ANALISI SPAZIALE E ISTITUZIONALE SUL RUOLO DEI PORTI COME PROMOTORI DI ECONOMIA CIRCOLARE

Sommario

I porti hanno storicamente seguito un modello di crescita lineare a livello globale, accompagnata da processi quali espansione, delocalizzazione, abbandono, rigenerazione. Il concetto di circolarità – obiettivo che città e porti si propongono di raggiungere nel prossimo futuro – non è un argomento nuovo. Tuttavia, nonostante l'urgenza di raggiungere questo intento, la maggior parte delle città portuali non ha ancora compiuto seri passi in tale direzione. Al contrario, i porti contribuiscono sostanzialmente alla produzione di rifiuti e alla generazione di territori di scarto che definiremo *wastescape*. Nel presentare i due casi di Napoli, come città in attesa, e Rotterdam, come porto in transizione, l'articolo considera la rigenerazione circolare dei *wastescape* delle aree portuali come strategia innovativa per immaginare nuove forme di integrazione tra porto, città e il territorio metropolitano.

Parole chiave: paesaggi di scarto, città portuali, economia circolare

1. Introduction

The starting point of this article is the fact that land is a finite resource (UN-Habitat, 2018). Indeed, land scarcity affects cities, both urban and – even more – peri-urban areas. Port cities are located at the intersection of water and land, where different themes and global urgencies coexist and intertwine between both local and diversified contexts (Hein, 2011, 2016a, 2016b).

Global changes, such as excessive soil consumption, energy transition, climate change, global and local economies, and the development of large-scale infrastructures, are putting pressures on ports. It's estimated that climate change will, in fact, have a profound and disastrous impact on cities around the globe. UN-Habitat reported that approximately 70% of the world population will live in cities in the near future, and that 90% of the population today lives in or near coastal areas. The combination of these makes port cities particularly vulnerable and risky areas. However, this also means that the port cities can become new laboratories to test innovative and resilient solutions to these issues (UN-Habitat, 2018).

The increased population growth in recent years, together with the lack of coordinated policies between the European scale and national, regional, and local levels of planning have generated many chaotic urban conurbations around a variety of large infrastructures such as highways, railway stations, ports, and airports in many European cities. In the absence of comprehensive oversight, these infrastructures have generated fractures in both regional territories and marginal areas, and have strongly influenced the shape of the urbanization. Moreover, the increase in scale of such infrastructures (e.g. ports) has produced additional pollution and traffic congestion, creating a negative impact on the people's quality of life. According to UN-Habitat, more than 80% of the energy system in 2012 was based on fossil fuel, with only 9% of the system being made up of renewable energy sources such as wind, sun, and biomass (UN-Habitat, 2018). In the 7 years following this study, the situation has not changed much. Although there is a clear urgency to shift towards a circular model, central and local authorities have not yet taken serious steps to push us in this direction. The reasons for not doing so vary, with most of them including a lack of available economic resources required to achieve this aim. There is also an urgent need for real awareness towards the gravity of the problem among all the stakeholders responsible for this change. Most importantly, there is a strong dependence on a linear system that is based on non-renewable energy sources. This not only represents an institutional lock-in (Notteboom *et al.*, 2013), but also a strong obstacle towards the identification of alternatives that are able to frame material and territorial dissipation as reusable resources, rather than waste.

The availability of land has been always a crucial factor for the completion and development of a port. Always looking for new free and open lands, ports have historically followed a linear model of growth. Their processes of formation, expansion, reallocation, abandonment, and redevelopments are just some of the common steps that are followed over time by ports from all over the world.

It can be argued that historically, ports have followed a linear path of growth, which has looked at the consumption of virgin land as the only way for expansion. Thanks to this approach, when a port city needed to ensure their economic competitiveness and relevance, new port-related functions expanded into these open lands. Events such as the industrial revolution, and the container revolution of the 1960s, have definitively created a caesura between a port and its city's spatial structures. The result of this unsustainable pattern is that the port-related infrastructures of today, in some cases, are just overlapping territorial structures that do not necessarily represent a spatial connection or a valuable element of the

landscape.

With all of these concerns in mind, this article aims to contribute towards a shift away from linear system processes, which can be achieved by bringing together two research paths. The first one refers to the waste of land, and focuses on the newly conceptualized idea of wastescapes (Amenta and van Timmeren, 2018; Amenta and Attademo, 2016; Amenta, 2015; Palestino, 2015; Amenta, 2019; REPAiR, 2017, 2018). This path also includes "drosscapes" (Berger, 2006) and operational infrastructures of waste (Brenner, 2014). The second research path deals with the spatial configuration and governance structures involving port-cities, more specifically on the land "in limbo" within the port of Naples (De Martino, 2016). Land "in limbo" is a term used to explain the specific state and spatial conditions of areas that are located between a city and its port. These spaces are usually located at the edge of infrastructures, which include polluted soils and urban areas that are in a state of crisis. The article argues that the above-mentioned fragmented territories can play a positive role in circular urban regeneration. More specifically, a regenerative circular approach that implements the recycling of wastescapes, could contribute to a new form of integration between the port, the city, and the regional territory, with its surrounding hinterlands. Expanding on this scope, the reasoning involving wastescapes found in peri-urban areas is also included in this conceptualization of circularity. This is done to imagine new regional green networks, which is understood as an outcome of the territorial regeneration of wastescapes.

The topic regarding the relationship between port and city has changed, especially when compared to the past, as demonstrated by contemporary debate carried out during the "Port City Futures" conference that was held in Rotterdam in December of 2018. The conference pointed out that a new research agenda regarding port-city relations will require new collaborations between the port, the city, regional stakeholders, and academics.

Literature found in the port-city field has widely discussed the theme of waterfront regeneration, the phenomena of industrial disposal, and how they have characterized port cities worldwide since the 1970s (Bird, 1963; Hein, 2011; Hoyle and Hilling, 1984; Meyer, 1999; Schubert, 2011). In spite of this, ports still produce spatial abandonment (although in different forms), such as the contact spaces between infrastructures and the urban area, including industrial areas that are no longer serving the port. In addition to these issues, port cities are becoming much more complex territories, and are even embracing a metropolitan dimension. In this new large scale dimension, the waterfront themes and the port-city interfaces are also reformulated.

Port cities are dealing with a different concept of waterfront that no longer concerns the historical city, but the relationship between the port, the suburbs, and the old industrial areas. The elements that characterize this relationship are made up of various polluted lands, which are made up of brownfields, the buffer zones of port infrastructures, as well as neglected buildings that are not anymore suitable for the functions they were initially planned for. All of these areas are in a condition of waiting, and sit in anticipation for new life cycles to occupy them once again.

In the case study of Naples – which seems an exemplary example that encapsulates the situation that many seaport cities across Europe face – city and port actors find it difficult to define a common strategy for the port-city interfaces, which causes stalemates in historically significant waterfront sites, and beyond. As a result, the areas between port and city represent a chaotic collage of abandoned spaces, marginal areas, and undefined borders. These areas have a negative impact on both the quality of the space, and of the life of people living around the port.

As a counter example, the port and city authorities in Rotterdam have established unprecedented synergies, who have made both circularity and the recycling of port-city interfaces a regional planning strategy. This will not only reinvent the port itself. It will strengthen the relationship between port and the territory at large, both in terms of infrastructure and culture. Despite the differences in governance arrangements between the two port-cities analysed in this article, the planning strategy adopted in northern Europe highlights the importance of synergy between stakeholders. This approach also makes it a possibility to apply such a shared vision between any port and city, even for the port of Naples. This approach really looks at the port as a complex infrastructure, while at the same time also seeing it as a part of the local and regional territory.
The article draws data from both policy documents, and also existing literature dealing with port cities and wastescapes. In regards to Naples, the new national port reform, the city plans, and the port itself are analysed. When looking at Rotterdam, the analysis focuses on a roadmap for the shift towards the next economy, which has been prepared by the metropolitan area of Rotterdam-The Hague (MRDH). In addition to the roadmap, the port and city plan are discussed, more specifically in regard to their relationship to the project of *Stadshavens* (Havens City).
Finally, this article focuses on the circular regeneration of wastescapes found in port-related areas, and their ability to be used within a new local and territorial planning strategy. It will also focus on providing a different perspective to consider when using wastescapes to reinvent the ports (and specifically the port of Naples), at both a local and regional scale.

2. Wastescapes in port-cities

The cities of today are going through a period of transition (MRDH, 2016). More specifically with regard to the coexistence of many different flows of people, goods, and energy that move through port-cities and shape their complex dynamics.
At the beginning of the 20th century, ports underwent their first major changes as a result of the industrial revolution. Huge industries and refineries quickly settled into coastlines all over the world, causing irreversible impacts on the territories that they occupied, and are still visible to this day. Subsequently, and as a result of changes in the technology used in the shipping industry, ports moved away from the cities they occupied, and started settling into large new available terrains. During this period of transition, old ports were abandoned because they were no longer suited to efficiently respond to the demands of the global market. These two simultaneous processes of growth and contraction (Amenta, 2015), together with the shrinkage (Oswalt and Rieniets, 2006) of population density in more inner city areas, generated a network of left-over territories that lay in a state of wastefulness. These are the port-city wastescapes.
Up until this point, the model of growth that has been used by ports around the world has mainly been linear. It is a system that is completely out of scale compared to the city which it belongs, which has resulted in it being an unsustainable form of development. This unsustainable linear growth is based on the "use-consume-discard" principle, which leads to the excessive consumption of virgin resources, even including land itself. This principle has historically generated, and still generates, high amounts of material waste and wastescapes. Indeed, currently only 9% of our world is circular (Circle Economy, 2019). This low percentage makes the transition towards a 100% circular planet a dire necessity. This radical shift will require new spatial solutions, alternative governance structures, and most importantly, a profound change in our cultural behaviour. A Circular Economy (EEA European Environment Agency, 2016; EC, 2014; MRDH, 2016) tends to reduce the

consumption of virgin resources, which is achieved by giving new values to what is already existing, and aims to produce almost no waste.
Considering that soil is a widely used non-renewable resource (Zanotto and Amenta, 2017), and in order to achieve the ideal circularity, it is necessary to think about new strategies and solutions for the regeneration of wastescapes, which are largely present in port-city areas. The polluted lands that are located in these areas include brownfields, buffer zones of infrastructures, noise nuisance areas, underused open spaces in a waiting condition, as well as neglected buildings. These are just some of the kinds of wastescapes which characterize the areas between port, the city, and the hinterlands connected to the port. Today, these areas sit in waiting for new life cycles, and they represent a valuable resource that could potentially trigger a circular urban and territorial regeneration of the port-city.
As mentioned above, in order to ensure that this phase of transition will lead to a shift towards a more sustainable future for contemporary cities, material and spatial resources should be used consciously. This can be achieved by reusing them as many times as possible without imposing a loss on their value, resulting in the closure of the metabolic loops that define our cities.
A spatial dimension of circularity, that transcends the mere recycling of material waste, is thus ensuring of the regeneration of wastescapes, which will eventually lead to an improved quality of life and well-being for all the citizens of the city. The reuse of land (and therefore the recycling of wastescapes) is an approach that is still overlooked within the actual definition of circular economy, even though land can be considered as one of the most relevant resources in the development of contemporary cities.
We encounter a difficult problem when we talk about wastescapes and the circular potential of their reuse. There seems to be a lack of a widespread and shared definition of both their spatial configurations and their related processes, which is especially missing among all the involved stakeholders. On the one hand, this is a challenge, because it makes it more difficult for decision makers to identify such areas univocally. It also impedes them from both identifying their potentialities of wastescapes, and foreseeing their future regeneration. On the other hand, it represents an opportunity, because it gives a certain flexibility and openness to define them case by case. It also allows for the ability to experiment with them, which in turn makes way for the designing of eco-innovations (EC, 2012, 2018).
«Eco-innovation is any innovation resulting in significant progress towards the goal of sustainable development, by reducing the impacts of our production modes on the environment, enhancing nature's resilience to environmental pressures, or achieving a more efficient and responsible use of natural resources» (EC, 2012).
Highly infrastructured areas, such as the port-related wastescapes mentioned above, can be highly fragmented, even from a biodiversity point of view (EEA European Environment Agency, 2017). In this sense, the waiting condition that the wastescapes of port areas are currently in, can be seen as an opportunity to experiment with new ecological reconnections for these areas between the port, the city, and their hinterlands (Fava, 2005).

3. Naples: a port-city sitting in a waiting condition

Both the port and city of Naples require integration (Pugliano et al, 2018), and this need was demonstrated in a variety of participatory events. These transpired as contemporary

conferences and seminars, and they all took place in Naples within the last couple of years[1]
The relationship between the city and the port of Naples is a key issue that has generated a contemporary debate among different national and local authorities. This relationship is in a dire need for a rethinking, especially in the light of the mentioned context, and includes laws and actors that have changed completely compared to the past. The port-city interface in Naples is a paradigm that can be defined as the city-palimpsest (Russo, 2016). In this situation, the presence of the port has historically influenced the development of this city, and the other way around. In spite of this shared growth, the port-city interface currently represents a critical space, as it is an area of friction that contains a system of unsolved places. However, the port also represents a potentiality for the recycling of wastescapes related to the port, and can reverse the current planning approach that only conceives the port as just as an infrastructural corridor that is detached from the urban context.
For many centuries, the port and the city of Naples were closely interconnected. In the past, the port of Naples represented the main entrance to the city. It was the location of the city market, and acted as a meeting place for different cultures (Gravagnuolo, 1994; Amirante, 1993; Russo and Formato, 2014). The famous representation of the "Tavola Strozzi" (
) clearly shows the interconnection between the city and the sea.

Fig. 1 – Tavola Strozzi, Naples, 1472

Source: Attributed to Francesco Rosselli

However, this historical and functional integration of port and city has changed. Since the second half of the 19th century, the perception of the port as an integral element to the city's dynamics has shifted dramatically. The construction of the modern and industrial port definitively interrupted the historical and morphological integration of port and city, in turn also changing the perception that people had of both the city and port as a whole. The city and the port have slowly (but surely) separated in spatial, functional, and administrative terms. The separation also refers to a disconnection between the actors involved in port-city planning. Historically, both the multitude and heterogeneity of the responsible planning authorities have produced many uncertainties for the port-city relationship. Their policies

[1] Napoli Porto Aperto, http://www.portoaperto.it/; Seminar Naples meets Rotterdam, https://porto.napoli.it/napoli-incontra-rotterdam/naples-meets-rotterdam/; Naples shipping week, https://www.nsweek.com/.

have resulted in the areas where the port physically meets the city being put in what can be called as a "waiting condition" (De Martino, 2016).
In contrast to other port cities in Italy and beyond, a real regeneration process of the port areas in Naples has not yet started. On the contrary, many wastescapes still characterize the harbours cape of Naples, especially in the Eastern area of the port. Today, it is in this location that the city and port are still strongly separated by high fences or walls (**Errore. L'origine riferimento non è stata trovata.**). This segregation is leading to both a spatial fragmentation and degradation of areas that are both along the port-infrastructure and adjacent to the city.

Fig. 1 – Barriers which separates the port from the city, East Naples, 2018

At a local scale, the port of Naples is composed of several sectors that range from the tourism sector, to shipbuilding, commercial, and industrial sectors. Therefore, the port area involves several kinds of places that are characterized by different levels of accessibility. Some of them are made up of underused and abandoned buildings (
In addition to these observations, there are three different port-city relationships that can be identified. The first one refers to the Monumental and historic port (San Vincenzo Pier and Municipio Square) called the San Vincenzo Pier, which is a key part of the historic military port. Currently, both the wet basin and the 19th century buildings are partially occupied by the Italian Navy, which is in the process of ceasing its operations in the Neapolitan port. Some activities here are related to the a more sustainable use of the pier, which has been promoted by a community association called the "Friends of Molo San Vincenzo". This movement has helped to carry out a public debate through multiple study and recreational

activities in order to increase the enjoyment of the pier as a public space. In addition to this initiative, the area of Municipio square will have a new urban and spatial continuity that will develop in the coming years. It is also in this location that an ongoing project will provide new metro station to the area, which will make it possible to enter the city from the sea by going through the archaeological site of the ancient port (Fig. 4).

Fig. 2).
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Fig. 2 – Abandoned buildings between port and city, Naples 2017

The second area refers to the central part of the port, also known as the Mercato Square (

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). This is the core of the port, and is characterized by a variety of multi-functional activities. This is also a very problematic area, as it has a major concentration of abandoned or underused buildings, as well as marginal spaces that exist between the city and the port. The in-between areas of the city and the port (resulting as wastescapes today) can play an important role for the area, which can be achieved through their re-design process. Their regeneration can also allow for the recovery of the lost relationships between the city, the sea, the port, and even the regional territory.
Finally, the last area refers to the commercial port located in East Naples (Figs. 6 and 7). The eastern port area is made up of containers, temporary storage activities, and infrastructure flows that all create a significant barrier between the sea and the city. This area also has commercial hubs and large-scale infrastructures that overlapped each other. This organizational structure has created a very fragmented and problematic territory, especially from spatial, environmental, and social perspectives, thus giving rise to the various kinds of wastescapes that exist in this area and beyond (Amenta and Formato, 2016).

Fig. 4 – Metro's works at Municipio Square, Naples, 2018

Fig. 5 – In between areas towards Mercato square, Naples, 2018

Fig. 6 – Container terminal and infrastructure flows, Naples, 2018

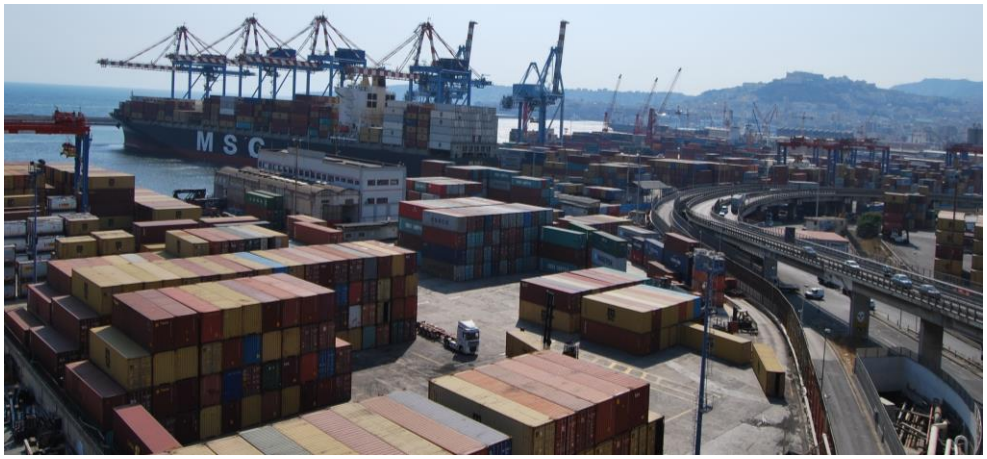
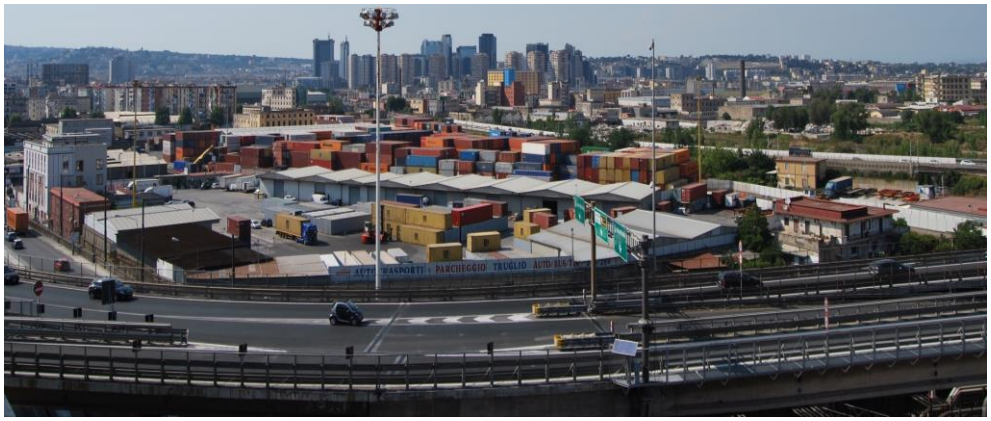


Fig. 7 – View towards the Eastern periphery. Naples, 2018



East Naples is made up of different visions, actors, and plans that all coexist together at the same time. This plurality of actors creates contrasting futures in regard to what the relation between port and city could potentially be. The new Italian National Strategic Plan of Ports and Logistics, approved by the Council of Ministers in July of 2015, is a strategic planning tool that aims to improve the competitiveness of Italian port and logistics systems. In addition to these goals, the strategic plan also aims to facilitate economic growth, promote intermodality with other transport networks, and even simplify existing governance structures. This new plan then attempts to give an answer to the institutional conflict by re-framing the theme of the ports into a new logic system that works at both the regional and national scales. Following the reform, the port authority of Naples became the authority of a larger port system which, in addition to its own, also incorporated the ports of Castellammare di Stabia and Salerno. With this new perspective in mind, the collaboration between ports should lead to an optimization of resources, while also avoiding the consumption of new areas for port expansions. However, this large-scale vision contrasts with the local visions of the port and the municipality, who both have very different ambitions. One factor to consider is that the large-scale port plan is a long-term vision. It aims to improve the competition of the port(s) by promoting investments in the infrastructural development within the Eastern part of the port (Fig. 8). It also aims to improve the relationship between the city and its historical waterfront.

Fig. 8 – Masterplan port of Naples

Source: The Central Tyrrhenian sea port system, https://adsptirrenocentrale.it/wp-content/uploads/2019/01/MP_02-Assetto-degli-spazi-portuali-Linee-di-indirizzo-al-2030.pdf

Recently, the Campania Region approved the Regional Strategic Development Plan for the development of Special Economic Zones (ZES). The ZES were introduced to encourage economic investments in logistics centers such as ports, interports, and industrial areas, especially the area of East Naples. Therefore, the port authority aims to invest in the local Special Economic Zone (ZES), with the purpose to promote industrial, infrastructural, and economic development in the Campania region (Autorità di Sistema Portuale del Mar Tirreno Centrale, 2017). On the contrary, the municipal plan frames the port and its infrastructure as the main element of separation between the city and the coastline. The city plan defines the criteria for a possible port-city integration, and has identified some important intervention strategies. These include the recovery of the relationship with the sea through a park along the coast, the construction of an Archaeological Park that includes the fort of Vigliena, the restoration of the Ex Corradini building, the construction of a marina, and the injection of a new university site (now built by the Federico II University) in the Ex Cirio area (Comune di Napoli, 2009). The city vision, therefore, seems to go in a completely different direction that the regional plan by relaunching East Naples as a new place to live. Both the port and the city have different visions regarding this part of the city, and a universal agreement on the future of the port-city relationship seems to still be far away from becoming a reality.

4. Rotterdam: a port-city in transition

Rotterdam sits at the intersection between two important economic systems: the Randstad and the delta area of the Rhine and Scheldt. In terms of spatial organisation, the southern area of the city is the logistic and industrial complex of the main port, while the northern zone is the area where economic services and business activities are located (City of Rotterdam, 2007).

Historically, the areas between the port and the city of Rotterdam have been first subject to

dereliction, with development coming afterwards. The River Mass and the port activities associated to it has been historically represented as both the physical separation and the social disparity between the two parts of Rotterdam.

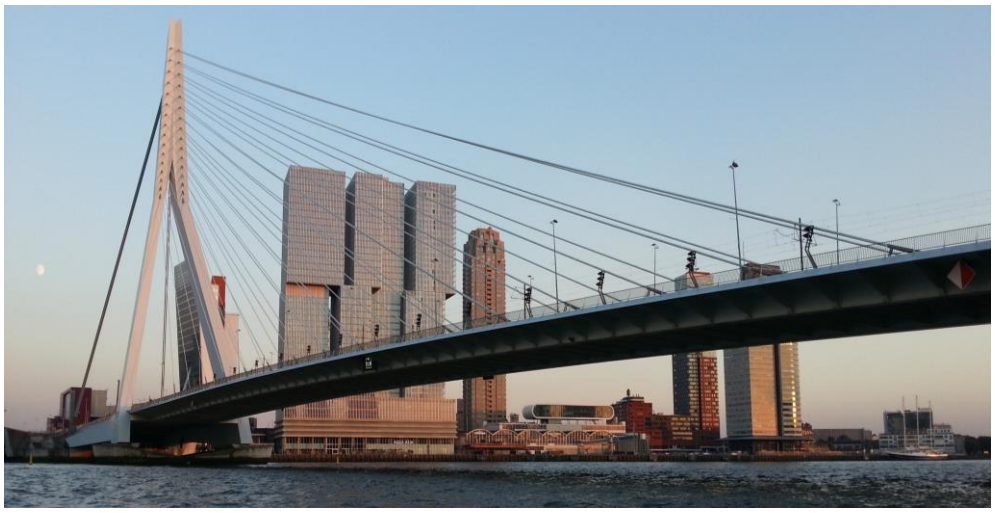
Fig. 9 – Rijnhaven, 1957

Source: Herbert Behrens/Anefo

Containerization and technological revolution in second half of 20th century represented an important breakthrough for the port. Containers required more and more space and deeper waters for ships. Therefore, central and local governments opted for the construction of port expansions outside the city centre. Port and city drifted apart, and huge areas were left behind for new urban uses. While in the 1970s the Dutch Government was constructing Maasvlakte 1 on the North Sea, the late 1980s and 1990s were known for the waterfront regeneration experiments especially in the area of Kop van Zuid with the redevelopment of disused inner-city docklands. The areas of Kop van Zuid, and in particular, the district of Katendrecht that exists behind the old port basin of Rijnhaven (Fig. 9), have historically represented some of the most problematic neighbourhoods of the city, and is famous for the presence of many social segregation problems.

Here, the city government decided to revive the city center with high rise offices and apartments, which gave a completely different identity to the city thus giving the city a metropolitan look.
Therefore, local institutions have worked actively, particularly since the 1970s (when the expansions of the port to the west left areas for new urban functions), in order to reduce social segregation and improve urban quality. Today, these areas are much more integrated with the rest of the city. The first waterfront regeneration in these areas began in Kop van Zuid (Fig. 10), giving the south bank of the river a renewed waterfront. This made it possible for this area of the city to establish a continuity with the center of Rotterdam, while also giving the city a brand new identity as a whole as well.

Fig. 10 – Kop van Zuid today. View from the river, Rotterdam 2018



On the other side of the city traffic and ship sizes continued to increase exponentially. This led the Dutch government to the construction of Maasvlakte 2 in 2008 (to be finished by the 2030). Maasvlakte 2 is the spatial response to naval gigantism that has forced the port authority to build a new container terminal at 40 km from the city of Rotterdam. Maasvlakte 2 is the result of a long period of negotiations between different authorities and citizens and at the same time an icon of the spatial separation between the port and the city of Rotterdam (Fig. 11).

Fig. 11 – Rotterdam's port development. An overview in history

Source: Rotterdam port authority, https://i.redd.it/ntdu9su3orr11.png

The uncertainty and risks related to the future challenges of Rotterdam require a different approach to the city and port plans of today. Issues regarding social fragmentation, energy transition, and digitization, are all in need for both new policies and resilient solutions. This will allow the city to be increasingly attractive, while allowing the port to grow sustainably with both its city and region in the future (Rotterdam, 2016).

Rotterdam has developed the concept of circular economy into a planning strategy at a metropolitan scale. This approach concerns both the city and the port of Rotterdam, as well as their relationship within a much larger territory, with the latter consisting of 23 municipalities that include Rotterdam and The Hague. This geographical agglomeration is called the MRDH, also known as the metropolitan area of Rotterdam-The Hague. Today, the MRDH aims to become the most innovative, economically strong, sustainable, and accessible region in Europe. It is for this reason that they have developed a roadmap to help the MRDH transition towards the next economy (MRDH, 2016). The main ambition is to move away from a centralized linear economy by moving towards a delocalized, distributed, and circular economy. This new economy will radically change the mobility system, the production of energy, and other various consumption models. In other words, the next economy will both change the way cities are managed, and the way people interact in society (MRDH, 2016). Therefore, the roadmap both works as a strategic orientation, and as an overall strategy towards innovation. Even though the economy of the region is still quite linear, as is the rest of Europe, the MRDH has the ambition to become the most circular region in the world.

«Circularity is defined as renewability of all natural resources: energy, water, biological and technical materials, air and top soil» (MRDH, 2016).

The overall goal is to have 100% of the region be powered by renewable energy by 2050. In order to get to this point, economic loops need to closed, environments needs to be respected, and land use needs to be reduced as much as possible. These potential achievements will not only have positive impacts on the environment, but also on the employment of the region. Old jobs will be lost, but new ones will be introduced. Start-ups, creative businesses, and recycle initiatives are already growing in the Netherlands, more

specifically in the Rotterdam area.

5. The port vision

At a more local level, the port of Rotterdam, which is the biggest port in Europe, aims to become the most sustainable port in the world by improving and controlling its "carbon footprint". In 2018, the port of Rotterdam had a total throughput of 469.0 million tonnes come through its warehouses. Rotterdam is the busiest container hub in Europe, with 14.5 million TEUs registered in 2018. In addition to these statistics, Rotterdam is the most important oil hub in Europe (together with Antwerp). More than 50% of the refineries in Northwest Europe are supplied via the port of Rotterdam. In addition to this, Rotterdam is also a location for the temporary storage of international oil flows. According to the port authority expectations, this function might become more important as a result of potential increased trade volumes of crude oil in the future (PoR, 2011a). Although the main concern of the port refers to industrial and infrastructural development, the port authority has made the collaboration and integration with the city a crucial aspect to their vision. This seems to be an imperative issue brought upon by profound changes in the global scenario. These changes include the state of global economies, the scarcity of resources, the increase in scale of ships and logistics, the integration with supply chains, and the threat of climate change are all challenging the future of the port of Rotterdam, and it is a major motivation in asking for an active collaboration with the city. It is because of all these reasons that since September of 2011, the Port of Rotterdam Authority has been working hard together with Deltalinqs, the Municipality of Rotterdam, the Province of South-Holland, and the Dutch national government. Their overall goal is to design an agenda for the future development of the port, and their collaboration has led to the definition of a project titled "Port Vision 2030" (PoR, 2011b).

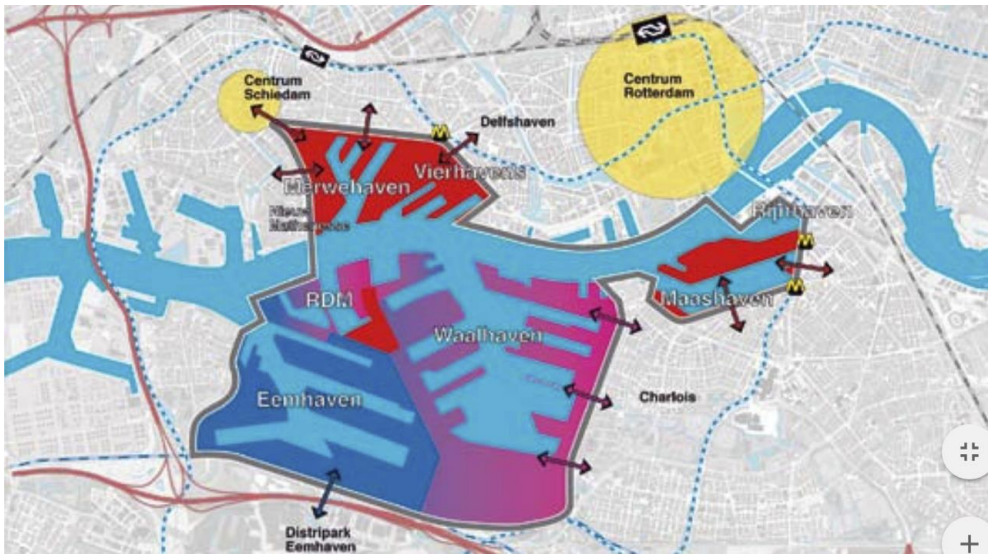
6. The city vision

Historically, the port has over time moved slowly away from the city. Now the port is looking for a reconnection back with the city. This means that the planning approach regarding the port-city relations of today have changed, especially when compared to the past, and Rotterdam represents an emblematic case to show this change. It is here that both the port and city authorities have developed a joint initiative called the "Stadshavens" strategy. The "Stadshavens" project started in 2002, and represents an example of the changing approach regarding port-city relations (Daamen and Vries, 2013). "Stadshavens" represents a second wave of waterfront regeneration. The project is not only about bringing the port back to the city, but it is about port and city authorities coming together to share ideas and common ambitions (Aarts, Daamen, Huijs and Vries, 2012).

The "Stadshavens" Rotterdam project is the result of the collaboration between port and city. It is the place where the port and urban visions finally meet together. "Stadshavens" Rotterdam covers an area of 1600 hectares, and the strategy includes an ambition of making this area the most innovative and creative hub in the world. Here, companies will link the port (logistics and maritime industry) with the surrounding housing and knowledge institutions. "Stadshavens" was designated as response to the national planning law, also known as the Crisis and Recovery Act (Chw), which forms the framework for subsequent zoning plans. "Stadshavens" is a development area with short (2015), medium (2025) and long-term projects (2040) (City of Rotterdam, 2007). This strategy identifies two main directions to create change. The first direction involves having the port become an energy port in the future. In order to get there, a profound change in the energy model needs to be

introduced. Sustainability, in fact, is the common theme that unites the city as much as the port itself. The second direction plans for some port areas to be converted into urban areas, but with more port related manufacturing industries. Old industrial areas will then be reused to allocate new functions and creative entrepreneurs. "Stadshavens" (Fig. 12), together with the RDM (an old shipyard), is the site that both the municipality and the port of Rotterdam has identified for the creation of a cluster of knowledge and innovation functions (Fig. 13). When all of these strategies are combined together, the overall approach represents a return of the port back into the city as a whole (City of Rotterdam, 2007).

Fig. 12 – Stadshavens area



Source: https://www.rotterdam.nl/wonen-leven/stadsvisie/

The "Stadshavens" Rotterdam strategy touches upon four sub-areas in the city, each with its own profile and development dynamics. The Waalhaven and Eemhaven areas will specialize as an important cluster for fruit, vegetables, and container transhipments. This area contributes to the sustainability of the area by developing a more intensive use of space, while also involving transportation that is based more on both inland and rail connections. In comparison to the other areas of the Stadshavens project, Rijnhaven and Maashaven are the areas closest to the city center. Here, one of the most surprising developments in the project involves a floating pavilion. Finally, Merwehaven and Vierhaven are planned to be developed over the next 30 years. They are expected to become an innovative district where both residences and companies in the field of energy and materials will coexist together. This area is also known as the Makers district (M4H and RDM). It is a testing ground and showcase for a variety of new economies and innovations (Vries, 2014). This area is the ideal location for new businesses to develop as companies can invent, test, and implement new technologies that are based on digitization,

robotisation, and smart manufacturing (City of Rotterdam, 2017).

Fig. 13 – RDM Campus, Rotterdam, 2018

Therefore, the pillars on which the port-city vision is built upon depends on strengthening the relationship of the city with the port, which will be achieved by improving the economy and the living conditions of the city. A fact that supports this vision is the awareness that over the past 30 years, there is no city in the Netherlands that has changed as much as Rotterdam has. The port of Rotterdam may not be the biggest port in Europe in the future, but it will certainly be the most sustainable. This means that the city is also willing to help the port meet the challenges of global change, and aims to transform them into opportunities for future sustainable growth (Rotterdam, 2017).

7. Conclusions

The Rotterdam Port Authority, together with the other local and national authorities, have come to understand the importance of shifting its linear model of growth towards a circular one. In fact, for the past several years now, mostly the port and city authorities have already been investing in this common direction towards circularity, although with different site-specific tools and approaches. These variations involve different local regulations and policies, as well as local resources. In this sense, one of the main topics addressed when considering circularity is represented by the implementation of alternative solutions towards energy transition and other circular economy principles. These are presupposed to re-think the whole system of relationships between built, unbuilt, and natural environments, while also considering people at the core of the processes. The port of Rotterdam is a complex infrastructure and global hub, but at the same time, as urban entities strongly dependent on local and regional economies. Because of the complexity of flows that cross through the port, it appears to be interesting laboratory that can experiment with new circular practices at both the local and regional scale. Ports are also places where different flows of production and waste meet, as they represent the places where different industrial clusters coexist together. On one hand, for port to move towards a circular model, the

recycle process should refer to material waste. On the other hand, it also relates to a higher scale of planning that involves both the spatial and landscape dimensions of recycling wastescapes. This concerns the need for new land, which has represented, and still represents, an important requirement for the competitiveness of a port. The availability of space also allows ports to adapt, to reinvent themselves, and to respond to the challenges imposed by global dynamics (such as energy transition, climate change, and increasing in scale of ships). Today these global pressures are pushing ports, cities, and regions to cooperate with each other. Therefore, cluster collaborations are proposed as way to optimize the use of land, while also preventing the occupation of new areas. These strategies indirectly provide improvements to the performance and functionality of a port. In this sense, reframing the port as a tool to embrace circular economy models has become an absolute priority for an important European port such as Rotterdam. Here, the renewed relationship between the port and the city will allow for a smoother transition towards a circular economy. This requires an active collaboration between the port, and the city itself. In the case of Rotterdam, after years of separation, the port authority looks at the collaboration with the city as the only possibility to improve the competitiveness of the port. This kind of collaboration is allowing the discovery of strategies for economic growth, and not at the expense of the city and the surrounding environment.

In the case of Naples, many steps have been taken towards a circular regeneration of the wastescapes that are related to the port, but there is still a lot that needs to be done. Both the spatial fragmentation and social degradation of the areas between the city and port, in addition to the zones related to the large infrastructure networks that connect the port with its hinterlands, are in a dire need to be reinterpreted. Port reform represents an important window of opportunity for both institutional and governance structures. However, these efforts are still concentrated exclusively on the infrastructure and logistics dimension of the ports. On the contrary, as shown by the case of Rotterdam, the port can become a driving force for territorial regeneration at different scales. As a result, the port can develop into a strategic tool for spatial, economic, infrastructural, and social territorial integration.

Within this new innovative perspective, the regeneration of wastescapes in Naples, which is characterized by its open, residual, and interstitial spaces, can give new life to ecological corridors. As a result, the area behind the port, which today is a system of disconnected fragments, can become a place to experiment with new forms of functional coexistence where logistics, urban areas, universities (already present in East Naples), and new forms of clean industry can coexist together. This requires a strong synergy between the different subjects and coordination of the different visions. Therefore, the recovery of wastescapes is presented as a strategic perspective that can trigger new forms of integration between the port, the city, and the metropolitan territory.

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